



Multiannual programme of the Joint Research Centre 1980-83

1983 Annual Status Report

Provision of scientific and technical services

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PROVISION OF SCIENTIFIC AND TECHNICAL SERVICES

1983

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Projects:

- Technical Evaluations
- Technical Assistance

Programme Manager:

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1. INTRODUCTION

Two kinds of objectives are pursued at the JRC in direct support of the various General Directorates of the Commission: Technical Evaluations where system analysis techniques are mainly employed and Technical Assistance where laboratory measurements, technical expertises and management of projects are provided.

Technical Evaluations

One of the tasks of the services of the European Communities is to study the Community's policy in various sectors, to forecast developments or to indicate targets. This is especially true for the industrial, scientific and technological policy, for the energy policy and for the policy on the resources and the environment. In these fields it is desirable to have some tools available for the analysis, to enable the Commission to get the right overview of the necessary information. System analysis is a helpful approach for the purpose, including techniques such as computer modelling and data handling, system optimization and simulation, cost benefit studies and technical assessments. The multidisciplinary competences available and the specific

competence in treating data enables the JRC to execute this kind of research in various fields.

The JRC therefore acts for the Commission as a source of technical advice, taking active part in setting up and running an information network. The work for this project is done upon specific request of the various services of the Commission. The detailed programme for each action is established yearly by an Advisory Committee of General Directorates representatives which makes a choice of the various needs and sets up priorities. Although the field of possible applications of system analysis techniques is large, three outstanding important aspects, which fit particularly well with the competences of the JRC, should be mentioned:

- Resources (e.g. model of regional development, studies on agricultural production patterns, raw material problems).
- Energy (e.g. analysis of the energy system, evaluation of technological progress, studies on energy conservation)
- Environment (e.g. collecting and updating information concerning ecological models, providing scenarios of the geographical distribution of pollutants emission).

Technical Assistance

An important and expanding activity of the JRC consists in providing the Commission with technical and scientific assistance and analysing technical problems required e.g. by the implementation of new regulations, by evaluating research proposals, by collaborating in the technical management of contracts, by comparing and synthesizing results etc.

These activities may involve collaboration with a number of national laboratories as well. On the other hand, the requirements of independency and secrecy which often are needed for the execution of the work, can be best satisfied in a laboratory operated by the Commission like the JRC.

The activity is splitted into two main parts: the first dealing with laboratory analyses and development of experimental techniques and the second concerning the technical assistance to project management and the provision with scientific advices.

2. RESULTS

TECHNICAL EVALUATIONS

In 1983 the activity for the project «Technical Evaluations» was mainly concentrated in the energy field, covering chapters on «Energy savings», «Nuclear energy strategy studies», «Analysis of the energy system». In addition some work was also carried out on «Special transport problems», on the «Utilization of local resources in Developing Countries», on «Occupational Safety and Health» and on studies of the «Perception of technological risk».

Energy savings

Energy Bus Programme

The «European Data Service for Energy Savings» was established at the JRC Ispra, following the adoption of the European Energy Bus Programme by some of the Member States.

This service was set up to aid those participants who are in the pre-operational phase of their respective energy bus programme and to link all the energy savings programmes in such a way that each country benefits from them as a whole.

During the reporting period a series of improvements and an upgrading of the Data Base have been realised, which consist among others of the modification of the data acquisition system, the introduction of a new selection criterium for the compilation of statistical tables and the improvement of the management of the European Data Services. This Service, which is based on data supplied by the participants participating in this project, is now working well at Ispra. Additionally, a new interrogation procedure of the EDSSES data base has been elaborated, which allows on-line access to the data base through EURONET and national networks and which guarantees at the same time the confidentiality of the information stored in the data bank.

Energy conservation in buildings

Survey studies

The activity has been mainly devoted to the collection of both climatic and building stock data as well as to the testing and the analysis of a method for survey studies.

This method is aimed at:

- giving information on national or regional conservation potentials in the household sector;
- suggesting the necessary accuracy of the data bases.

A preliminary application of the method was related to the Italian building stock.

Nuclear energy prospects

Nuclear strategies

The collaboration with the EC-Unipede Working Group on Fast Reactors was resumed. The group has created a subgroup in which the JRC is represented. Its task is to investigate the economic aspects of the nuclear strategies involving Fast Reactors. Therefore an analysis was being carried out on the possibility of estimating the long term relationships between production cost and depletion of Uranium resources. This can be done by making use, on a statistical basis, of present individual deposit data, both on grade and tonnage.

A preliminary version of the code for the evaluation of the nuclear electricity production cost has now been developed and tested.

Experimental Data Bank for the Euratom Supply Agency

This Bank was prepared in the framework of the project for the informatisation of the activities of the Supply Agency, and is intended to store contractual data of commercial transactions on nuclear materials. Although the Data Base of the Bank has already been created in 1982, during the reporting period more than 100 new contracts have been added to this data base.

Several computer programs have been prepared, for handling or using the data stored in the data base.

These programs are of a conversational type and can be remotely accessed. They have been conceived in such a way as to be usable by the clerical staff without particular knowledge of informatics. Appropriate «how-to-use» reports have been prepared for all the programs.

The Bank is now ready for the input information to be introduced in order to be run in a first experimental phase.

Energy models

MEDEE 3 model

The activity on the energy models of DG XII has been focussed on the preparation of the Italian case of MEDEE 3 and in particular it has been devoted to the analysis of the tabular functions of the urban system.

The tabular functions in MEDEE 3 quantify relationships among the system variables during the period under investiga-

tion. The determination of the tabular functions is based on the analysis of economic and technical time series. When these informations are lacking, as in the case for Italy, some functional relationships connecting the variables must be created. In this context, the experience gained in the Italian household sector was particularly useful for the energy conservation studies.

Energy and employment

The research on this point has started to evaluate some effects on employment corresponding to different technological choices in the energy policy analysis. To perform this goal, a study contract has been signed on the matter with the University of Venice. In the frame of this study the collaboration has started with the construction of an econometric demand model for the medium term period.

Some of the main features of the model are:

- The private consumption description by a complete system of demand equations with a nested submodel of energy consumption.
- The goods investment model description.
- The introduction of labour and capital interrelated demand equations.
- A long period model of the housing sector which underlines the interactions between the economic and demographic aspects in disequilibrium.

The data base construction of the model has been mainly fed by information derived from ISTAT. Another source should be EUROSTAT in particular for the part which concerns energy prices.

Transport

World Shipbuilding Data Bank

The activities on the World Shipbuilding Data Bank consisted of improvements and changes in response to the requirements. The Bank contains information on the total orderbook, ships under construction, ships delivered and placed into service during consecutive years and throughout the world.

This information is specified according to different criteria like type of ship, building country and flag of registration.

The Data Bank is now regularly in operation at the JRC-Ispra from which quarterly and annual statistics are produced. This statistical information is transmitted via EURONET to the relevant services of the Commission in Brussels. A number of on-line interrogations can also be made by the same services using the existing software. New software requirements are in study in order to make the Bank also available to external EURONET users.

Magnetically levitated transport systems

On behalf of DG VII, bibliographic data and information was gathered on the extensive research and development of magnetic suspension and of linear electric motors in course in different countries.

During the visits in Japan (University of Tokio, MAGLEV project of the Japanese National Railways, M.A.L. project and Ministry of Transportation) important information was obtained on the Japanese activities and perspectives. In France, technical information was obtained on the Franco-German project which is at present under development. A report on the different projects in the world concerning Magnetically levitated transport systems was issued.

Utilization of local resources in developing countries

The modified orientation in the policy of industrial countries as for the help to less developed countries is of consequence for the practical work in this field. Therefore, growing effort has been put on the contacts with both the Head Quarters and Regional Offices of the World Health Organization for a harmonization of the W.H.O. and E.C. technical goals. This includes a revision of the definition and implementation of Appropriate Technology. Appropriateness refers in this context to technologies selected or shaped to the conditions of a specific limited region within less developed countries. Scope is most of all the improvement of the life quality in less developed countries in general and primary health care in particular. The collaboration with the World Health Organization dealt with the exchange of view concerning technical contributions by renewable energies to the W.H.O.-Headquarters' programme for «Health to All by the Year 2000» and the «Drinking Water Decade». Furthermore proposals have been made on solving the cooking situation in the Refugee Camps along the Ethiopian border in Somalia, whilst plans have been discussed for sending technical field workers as advisers in Somalia. New data on agricultural cooperatives and on educational radio network stations sent by the Ethiopian Authorities have been elaborated and a report sent out.

Assessment on pollution problems

Occupational Safety and Health

Within the diffusion of the most recent knowledge about health and safety in the work-place, the CEC (DG V) is publishing a monographical series that, on the basis of about 40 reports, describes the techniques of Biological Monitoring of professionally exposed workers in three chief categories of industrial tossics: metals, solvents and pesticides. During the reporting period, the editorial board has coordinated the bringing up to date and the critical review of a second group of four monographs: Styrene, Aluminium, Chromium and Anticholinesterasic organic pesticides.

Perception of Technological Risk

In one way or another, risks of technology are shaped in terms of kind, magnitude and frequency by the regulatory strategies which govern the licensing, operation and inspection of hazardous activities. In industrialized societies a large proportion of government activities may be described as «regulation». Therefore the study was devoted to explore some principle elements of regulation, contrasting their realities with the implicit assumptions of the idealized model.

From the result of this study, which is summarized in a publication «On the Regulation of Technology», the conclusion can be drawn, that more work should be devoted to identify and to analyse the non-technical determination of regulations, and thus of risks.

TECHNICAL ASSISTANCE

Laboratory analysis

The main activities developed in 1983 concerned, besides the JRC contributions as project leader to the COST-actions 61a bis and 64b bis (on the physico-chemical behaviour of atmospheric pollutants respectively on the analysis of organic micropollutants in aquatic systems), the studies on dairy products, on fertilizers, on trace metals in biological fluids and on the COST-action 68 ter «Use and Disposal of Sewage Sludge».

Dairy products

The work in course on request of the General Directorate for Agriculture consisted of the critical evaluation and the improvement of the spectrophotometric procedures for the selective determination of the whey content of milk-powder. A simple analytical method had to be found, to be used as screening method, which has a relative high accuracy and reproducibility and which does not introduce adulterations of the pure milk powder.

The free sialic acid content can be considered as a useful tracer to detect whey in the milk powders due to the suitable relationship between the content of sialic acid and total proteins.

Several samples of milk and buttermilk powder have been analysed.

The analytical procedure is suitable for milk and buttermilk originated from sweet cream; buttermilks derived from fermented cream furnish high and scattered contents of free sialic acid. This behaviour is due to some interferences which unfortunately could not yet completely be eliminated during the analytical flowsheet. Further analytical research is necessary, which involves also the critical revision of other analytical procedures.

Fertilizers

The activity involved the participation of the JRC both as EC laboratory and as EC expert in the meetings of the various workings groups of the International Standard Organization, in order to submit EC analytical procedures for the determination of various components of different types of fertilizers and to let accept them on a larger international basis.

To this end, analytical methods are tested, improved or developed.

Based on the results obtained from interlaboratory exercises, the most reliable analytical method is selected and accepted as standard method. The determinations dealt with, concerned the water content and the content of some heavy metals of the most important fertilizers.

The analytical procedures used for the determination of some heavy metals contents were giving good and reproducible

results.

Trace metals in biological fluids

Owing to the experience acquired as reference laboratory in the activity of the biological screening of the population for lead (Council Directive n° 77/31 L of March 1977) the JRC has been invited by UNICHIM and ISTITUTO SUPERIORE SANITÀ (Roma) to continue its participation in the working group which is formed by representatives of national Italian laboratories for the determination of lead and cadmium in blood. During the interlaboratory campaign 25 blood samples have been analysed for lead and cadmium. Work is still in course to evaluate the obtained results.

Cost-Action 68 ter

The use of sewage sludge in agriculture and in connection to this, the accumulation of micropollutants in soil and their unavoidable enrichment in the food chain, led to research activities on pathways, accumulation factors, uptake mechanisms and toxicity of two groups of micropollutants: toxic trace elements and organic trace components.

The activity was concentrated on the problems of polychlorinated biphenyls (PCB's) which enter the agricultural foodchain mainly through the application of sewage sludge on agricultural land and on the analytical errors associated with the determination of plant-available heavy metals in sewage sludge amended soils.

PCB analyses of digested sludge extracts and of dry sludge are going to be completed.

Since the most hazardous plant-available heavy metals (cadmium, mercury, arsenic) in sludge amended soils are also the analytical most problematic ones, it was decided to investigate the current state-of-the-art of heavy metal determination and to develop simple and straight-forward analysing procedures, which requires loss-and contamination free destruction of the sample matrix and a correct, interference-free final determination.

Based on the planned analytical exercises, a number of grown test materials, representing the most important material groups (cereals, potatoes and vegetables) grown on sewage sludge amended soils, were further processed (homogenization). A part of the materials is ready for use.

Scientific/Technical Advices

Support to the Custom Union Service

The activity is dealing with the formulation of technical/scientific opinion for the Committee of Exemption of Custom Duties on the qualification of instruments produced outside the Community and to be imported duty free.

The scientific nature of the instruments manufactured outside the Community and subsequent imported, have to be compared with similar types of instruments manufactured by firms inside the EC for which the opinion from specialists of the JRC in Ispra, is requested.

A laboratory activity also started for a better approach to the problems rising from the specification of components and

devices which may compose an instrument or a chain of instruments.

An other specific activity was the technical assistance given to the Legal Service in the frame of the Commission's decision against the duty-free importation of computers in the EC.

Support to Demonstration Projects

A contribution was given to the analysis of proposals for demonstration projects in the field of energy savings, of biomass and of energy from waste.

The proposals in the field of energy savings concerned mainly: Buildings, Heat pumps, Combined heat-electricity production, Use of process heat and of electricity in industry and in agriculture.

Olive tree register

Assistance was given to GD VI during the reporting period, for the implementation in Italy of the olive tree register technique, formerly developed at the JRC.

3. CONCLUSIONS

This programme is aiming at providing support to the Commission services in various fields where the JRC has a competence. By doing this, the JRC contributes with its technical and scientific work to a better fulfillment of the tasks of the Commission services in a number of sectoral policies.

The project Technical Evaluations corresponds to two types of work: general system studies, computer modelling and technical assessments. The activities in this project were mainly concentrated on problems concerning the energy sector, which requires thorough analysis in preparation of any decision making. In particular, the modelling of the energy system, the con-

tributions of nuclear energy were dealt with.

Energy saving problems were also analyzed. This work is closely connected with the Commissions indirect research action and with the actions of the Commission services responsible for energy and for industry and includes a collaboration with a number of national institutes in the Member Countries active in this field. In particular the energy conservation in buildings and the energy audits for small and medium industries (Energy bus project) were treated. Another activity in course concerned the utilization of local resources in developing countries and is performed on request of and in tight connection with the competent Commission Services and the local authorities of the interested countries. This activity relates the competence of the JRC in the energy field with the real energy needs of developing countries.

Besides the activity on the Shipbuilding Data Bank which is aiming at providing the competent Commission service regularly relevant information on shipbuilding, technical support was also given to the competent Commissions service in the field of Occupational Safety and Health. Finally a scientific contribution was given to the FAST project which aims to exploring the long term future of the scientific and technical evolution of our society.

The second project of the programme, Technical Assistance, consisted of specific experimental work on, among others, the composition of fertilizers, dairy products, trace metals in biological fluids, sewage sludge and on the aquatic environment. The scope of it is to develop or to select reliable analytical determination methods and to let them be accepted as standard method on a large international scale.

Another part of this project is dealing with technical consultations, such as the contribution to the Commissions services for giving judgements on the qualification of scientific instruments produced outside the Community for a duty free import, to demonstration projects in the field of energy savings and to the implementation in Italy of the olive tree register technique.

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